

claims 11/23/04

IN THE CLAIMS

1-35. (canceled)

36. (previously presented) The method of claim 66 wherein the step of administering is via the oral route.

37. (previously presented) The method of claim 36 wherein the bacterium is top-dressed on a feed of the ruminant.

38. (previously presented) The method of claim 66 wherein the step of administering comprises injecting the bacterium subcutaneously.

39. (previously presented) The method of claim 66 wherein the step of administering comprises injecting the bacterium intradermally.

40. (previously presented) The method of claim 66 wherein the step of administering comprises injecting the bacterium intramuscularly.

41. (previously presented) The method of claim 66 wherein the step of administering is via the nose.

42-65. (canceled)

66. (currently amended) A method of inducing immunity to pneumonic pasteurellosis in ruminants, comprising the step of:

administering to a ruminant a live *P. haemolytica* bacterium which contains no non-*P. haemolytica* DNA and which, when in a physiological environment, (a) expresses no biologically active leukotoxin and (b) expresses a mutant form of leukotoxin molecule which is a deletion mutant of about 66 kDa which lacks amino acids 34 to 378 of the wild-type leukotoxin and which induces antibodies which specifically bind to and neutralize biologically active leukotoxin, ~~whereby immunity is induced.~~

67-80. (canceled)

81. (presently amended) A method of inducing immunity to pneumonic pasteurellosis in ruminants comprising, administering a vaccine formulation which comprises:

(a) a killed *P.haemolytica* bacterium which contains no non-*P.haemolytica* DNA and which expressed a deletion mutant leukotoxin when it was alive; and

(b) a *P.haemolytica* deletion mutant leukotoxin in the form of a purified protein or in a preparation selected from the group consisting of a bacterial lysate, a bacterial extract, and a culture supernatant;

wherein the deletion leukotoxin molecules of (a) and (b) have a molecular weight of about 66 kDa, lack amino acid residues 34 to 378 of the wild-type leukotoxin molecule, and induce antibodies which specifically bind to and neutralize biologically active leukotoxin.

82. (previously presented) The method of claim 81 wherein the step of administering is via the oral route.

83. (previously presented) The method of claim 82 wherein the vaccine formulation is top-dressed on a feed of the ruminant.

84. (previously presented) The method of claim 81 wherein the step of administering comprises injecting the vaccine formulation subcutaneously.

85. (previously presented) The method of claim 81 wherein the step of administering comprises injecting the vaccine formulation intradermally.

86. (previously presented) The method of claim 81 wherein the step of administering comprises injecting the vaccine formulation intramuscularly.

87. (previously presented) The method of claim 81 wherein the step of administering is via the nose.

88. (currently amended) A feed for ruminants which comprises a live *P. haemolytica* bacterium which contains no non-*P. haemolytica* DNA and which, when in a physiological environment, (a) expresses no biologically active leukotoxin and (b) expresses a mutant form of leukotoxin molecule which is a deletion mutant of about 66 kDa which lacks amino acids 34 to 378 of the wild-type leukotoxin molecule and which induces antibodies which specifically bind to and neutralize biologically active leukotoxin, ~~whereby immunity is induced.~~

89-90. (canceled)

91. (presently amended) A feed for ruminants which comprises:

- (a) a killed *P. haemolytica* bacterium which contains no non-*P. haemolytica* DNA and which expressed a deletion mutant leukotoxin when it was alive; and
- (b) a *P. haemolytica* deletion mutant leukotoxin in the form of a purified protein or in a preparation selected from the group consisting of a bacterial lysate, a bacterial extract, and a culture supernatant;

wherein the deletion leukotoxin molecules of (a) and (b) have a molecular weight of about 66 kDa, lack amino acid residues 34 to 378 of the wild-type leukotoxin molecule, and induce antibodies which specifically bind to and neutralize biologically active leukotoxin.

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92. (currently amended) A vaccine for reducing morbidity in ruminants, comprising a live *P. haemolytica* bacterium which contains no non-*P. haemolytica* DNA and which, when in a physiological environment, (a) expresses no biologically active leukotoxin and (b) expresses a form of leukotoxin molecule which is a deletion mutant of about 66 kDa which lacks amino acids 34 to 378 of the wild-type leukotoxin and which induces antibodies which specifically bind to and neutralize biologically active leukotoxin, ~~whereby immunity is induced.~~

93-94. (canceled)

95. (presently amended) A vaccine for reducing morbidity in ruminants, comprising:
(a) a killed *P.haemolytica* bacterium which contains no non-*P.haemolytica* DNA and which expressed a deletion mutant leukotoxin when it was alive; and
(b) a *P.haemolytica* deletion mutant leukotoxin in the form of a purified protein or in a preparation selected from the group consisting of a bacterial lysate, a bacterial extract, and a culture supernatant;
wherein the deletion leukotoxin molecules of (a) and (b) have a molecular weight of about 66 kDa, lack amino acid residues 34 to 378 of the wild-type leukotoxin molecule, and induce antibodies which specifically bind to and neutralize biologically active leukotoxin.

96. (previously presented) The method of claim 66 wherein the live bacterium is lyophilized.

97. (previously presented) The method of claim 66 wherein the live bacterium is reconstituted from a lyophilized preparation.

98. (previously presented) The feed of claim 88 wherein the live bacterium is lyophilized.

99. (previously presented) The feed of claim 88 wherein the live bacterium is reconstituted from a lyophilized preparation.

100. (previously presented) The vaccine of claim 92 wherein the live bacterium is lyophilized.

101. (previously presented) The vaccine of claim 92 wherein the live bacterium is reconstituted from a lyophilized preparation.

102-104. (canceled)